

BUILDING No. 45 CASE HISTORY



World's largest "domed" stadium puts a lid on rising costs

Completed in late 1975, the 80,400-seat Pontiac Stadium boasts a final construction cost of \$42 million. Compared to other domed stadiums built recently, it cost substantially less. Its revolutionary type of cable-restrained roof system went up much faster than conventional designs. And the construction management technique—in which the architect, owner and construction manager work together to design and specify as they progress—saved the "cost of time." The structure was completed within the two-year time frame and on budget!

Pontiac Stadium, Pontiac, Michigan

Prepared by: Sales Engineering Division, Bethlehem Steel Corporation, Bethlehem, PA 18016

Building Facts:

No. of levels: 3

Height, above parking level: 151 ft

Height, above field level: 202 ft

Length: 770 ft

Width: 600 ft

Playing surface: 92,000 sf

Gross usable space: 120,000 sf

Total construction cost, excluding land:
\$42 million

Roof structural system: a network of structural steel strand tension cables restraining an inflated fabric membrane attached to the network

Time to erect roof: cables—18 hr;
entire roof—70 working days

Cable connection method: open-strand socket attachment to compression ring

Roof weight: 0.93 psf; 200 tons

Type of foundation: walls on spread footings; columns on caissons

Fire protection: roof fabric is incombustible as defined by NFPA 101

Building codes: BOCA (with granted variances)

Owner: Pontiac Stadium Building Authority, Pontiac, Mich.

Architect: O'Dell/Hewlett & Luckenbach, Inc., Birmingham, Mich.

Construction Manager: Barton-Malow Company, Oak Park, Mich.

Structural Engineer (except for roof): McClurg & Associates, Bloomfield Hills, Mich.

Roof Structural and Mechanical Engineer: Geiger-Berger & Associates, New York City

Strand Erectors: Agressive Erectors & Bridgemen, Inc., Inglewood, Calif., and Argo Steel Construction, Detroit; Evergreen Helicopters Inc., McMinnville, Ore.

Fabricator (compression ring and supports): Mississippi Valley Structural Steel Co., Lansing, Mich.



The value of the corner cut-outs, which provide an ideal seating arrangement, is clear in this view of the November 9, 1975 game, when the Lions defeated the Cleveland Browns, 21-10.

Steel-cable network restrains a 10-acre roof supported by air pressure

The cable network consists of two diagonal sets of nine cables each crossing over the playing field and clamped together at their intersections. The fabric roof is made of panels of plastic-coated fibrous glass which are .032 in. thick. Each panel is clamped to the cables between gaskets to produce an airtight seal.

15-year upward cost spiral reversed.

The final cost of the total Pontiac Stadium project, \$55.7 million, includes land, various fees, bond interest, and initial operating expense, as well as construction costs. This is substantially below the \$163-million New Orleans Superdome, which seats 74,674, and also was completed in 1975. Another comparison may be made with Houston's 50,000-seat Astrodome, built in 1965 at a cost of \$34 million.



A new era in roofed-over stadium costs was ushered in on Saturday, August 23, 1975, when the Detroit Lions defeated the Kansas City Chiefs, 27-24. Played in the 95-percent completed Pontiac Stadium, the event attracted some 62,000 fans. Although the stadium is essentially rectangular in shape, its four corners are cut off at 52° angles to permit optimum seating and viewing.



Left: Cable pattern consists of 18 strands crisscrossing. Here, the 1-inch line is attached to the ninth cable. In the foreground is the clevis and pin assembly used to secure ends of the cable. Upper right: A winch and taglines draw the clevis into place. The winch held the clevis while the locking pin was driven, permitting some flexibility in Skycrane altitude. However, clearances were as small as 1/8 of an inch. Installation time for each cable varied from 25 to 40 minutes. Lower right: View of stadium with most of the 80,400 seats already in place. The playing field will be covered with synthetic turf, which will be laid over dirt rather than the more usual concrete, permitting use of the stadium for events such as rodeos.

both ends dangling, flew it to one side of the stadium where a small line was attached. The entire package, with small line in tow, was then flown to the other side of the stadium and the free end winched and pinned into place.

While the helicopter hovered, with the weight of the big cable supported on its own 75-foot winch line, the small line was used to pull the remaining free end back to the first side of the stadium. After both ends were permanently secured, the Skycrane descended gradually until the cable slipped off the half-wheel-shaped hanger at the end of the helicopter's winch line. The cycles averaged 30 minutes' flight time each.

Impressed Contractors

"It's a heck of a good way to hang cables," said Buzz Bickerton, president of Aggressive Erectors and Bridgemen, Inc., of Englewood, Calif., who rigged the job.

General contractor for the Pontiac project is Barton-Malow Construction Management Services of Oak Park, Mich., and O'Dell-Hewlett & Luckenbach, Inc., of Birmingham, Mich. are the architects.

Evergreen's Hal Symes, whose experience combines construction, rigging and aviation, is the company's national construction marketing representative. His offices are located in Atlanta, Georgia.

